

REMARKS

In the Office Action, the Examiner objected to claims 1-17 and rejected claims 1-17 under 35 U.S.C. § 102(b) as being anticipated by USP 6,023,566 issued to Belkhale et al. (Belkhale). Applicants have canceled claim 3 and added new claims 18-21. Accordingly, claims 1, 2, and 4-21 will be pending after entry of this Amendment.

I. Amendment to the Specification and Drawings

In this Amendment, Applicants have removed embedded hyperlinks and corrected four typographical errors in the drawings and three typographical errors in the specification. No new matter had been added, as all the corrections are supported by the discussion in the specification and by the illustrations in the figures. Specifically, Applicants moved a “From 615” transitional arrow that previously pointed to operation 660 in the flowchart illustrated in Figure 6B to now point to the operation 655. This change is supported by (1) the referenced transition from 615 to 655 in Figure 6A, (2) the discussion in the specification on page 34, lines 5-7, and (3) the discussion in the specification on page 34, lines 8-22, which provides the rationale as to why the process 600 of Figure 6 transitions to 655 from 615 and 645.

Applicants also corrected the description of the operation 1445 in Figure 14. This correction is supported by the description in the specification on page 51, lines 15-17. In addition, Applicants added a “From 2242” transitional arrow to operation 2228 on Figure 22B. This correction is supported by the description in the specification on page 72, lines 14-15. Applicants also corrected the numbering of operation 2246 in Figure 22C. This correction is supported by the description in the specification on page 72, lines 19-20.

In the specification on page 31, Applicants changed an inaccurate reference to a transition from 615 to 660 in Figure 6B, to an accurate reference regarding a transition from 615 to 655. As mentioned above, this change is supported by (1) the referenced transition from 615 to 655 in Figure 6A, (2) the discussion in the specification on page 34, lines 5-7, and (3) the discussion in the specification on page 34, lines 8-22, which provides the rationale as to why the process 600 of Figure 6 transitions to 655 from 615 and 645.

On page 72, line 13, Applicants have also changed "2242" to "2202." This is a reference number for the operation that the process 2200 of Figures 22A-22C performs to generate several graphs. As mentioned in the specification on page 65, line 1 to page 66, line 16, the process 2200 generates these graphs at 2202. *See also* page 70, lines 15-17. Finally, on page 73, lines 2-3, Applicants have changed "[a]fter 2244, the process ends," to "[a]fter 2246, the process ends." As shown in Figure 22C, the process 2200 ends after it completes the database tables; as specified in the specification, the process 2200 completes the database tables at 2246, which proceeds 2244 in Figure 22C. *See* page 72, lines 19-20.

II. Claim Objections

In the Office Action, the Examiner objected to claims 1-17. Specifically, the Examiner stated that the term "output functions" used in these claims was not clear. The Applicants have amended the term to recite "output Boolean functions" to address the Examiner's objections thereof.

III. Rejections under 35 U.S.C. 102(b)

In the Office Action, the Examiner rejected claims 1-17 under 35 U.S.C. § 102(b) as being anticipated by Belkhale. Applicants have amended independent claims 1 and 14, and as the

rejection may be applied to the amended claims, respectfully traverse.

Amended claim 1 recites a method for performing technology mapping, the method comprising:

- a) receiving a design that is not bounded to a particular technology;
- b) repeatedly:
 - selecting from the design a candidate sub-network;
 - generating a parameter based on a set of output functions performed by the selected candidate sub-network;
 - based on the parameter, identifying at least one replacement sub-network from a storage structure that stores replacement sub-networks that are bound to the particular technology; and
 - replacing the selected candidate sub-network in the design with the replacement sub-network,
- wherein at least some of the selected candidate sub-networks have a graph structure comprising a first node having a first output outside the graph structure and a second node having a second output outside the graph structure, wherein the first node receives a direct or indirect input from the second node.

Applicants respectfully submit that Belkhale does not disclose, teach, or even suggest each limitation of claim 1. For instance, Belkhale does not disclose, teach, or even suggest the separate operations of selecting from the design a candidate sub-network, generating a parameter

based on a set of output functions performed by the selected candidate sub-network, based on the parameter, identifying at least one replacement sub-network from a storage structure, and replacing the selected candidate sub-network in the design with the replacement sub-network.

Instead, Belkhale discloses a method for technology mapping through the matching of candidate clusters to cells in a technology library based on whether two functions are permutation equivalent (col. 2, lines 53-67 and col. 5, lines 54-60). In Belkhale, the flowcharts shown in Figures 4, 5, and 7 and the discussion related to these Figures only describe the matching process of Belkhale but do not disclose the separate operations of claim 1. Applicants respectfully request that the Examiner specify the portion(s) of Belkhale that disclose each of the separate operations of claim 1.

In addition, Belkhale does not disclose, teach, or even suggest selecting, from the design, a candidate sub-network having a graph structure comprising a first node having a **first output** outside the graph structure and a second node having a **second output** outside the graph structure, as required in claim 1. Rather, Belkhale discloses only **single output gates** in the technology-independent network that is to be mapped using the matching process. For example, Belkhale states that the “gates in the technology-independent network are generally primitive gates such as AND, OR, NAND, NOR, and INV gates,” (col. 4, lines 33-35). The fact that the method of Belkhale only applies to **single output candidate sub-networks** is definitively stated on column 5, lines 35-60:

A candidate Boolean function f is said to match a library cell Boolean function g if there exists some permutation of the inputs that makes the function f equal to the function g , possibly requiring some inversions at the inputs and/or at

the output. This notion of equivalence is referred to as NPN equivalence (Negate Permute Negate), and can be more formally stated as follows:

Given a Boolean function f with inputs $X_1, X_2, X_3 \dots X_n$, find a permutation P and inversions at input $b_1, b_2, b_3 \dots b_n$ and at output b such that $f^b(P(X_1^{b_1} \dots X_n^{b_n}))$ exists in the library.

Note that in the above passage, a candidate function f matches a library cell function g if there exists some permutation of the inputs that makes the function f equal to the function g , possibly requiring some inversions at the inputs and/or at **the output**. Further, the candidate function f is described in relation to multiple inputs ($X_1 \dots X_n$ and $b_1 \dots b_n$) but only in relation to one **output b** . In addition, each Figure in Belkhale showing circuit networks show only single output gates (see Figures 2A and 3C).

Also, Belkhale does not disclose, teach, or even suggest that a candidate sub-network has a graph structure comprising the first node having the first output and the second node having the second output, wherein the first node **receives a direct or indirect input** from the second node, as required in claim 1.

As such, Belkhale does not disclose, teach, or even suggest each limitation of claim 1. Therefore, Applicants believe claim 1 is in allowable form. Claims 2 and 4-13 are dependent upon claim 1, and thus are also allowable for at least the same reasons as claim 1.

Claim 14 is a computer program claim containing limitations similar to claim 1 and is allowable for at least the same reasons as stated above for claim 1. Claims 15-17 are dependent upon claim 14, and thus are also allowable for at least the same reasons as claim 14.

IV. New Claims 18-21

New claims 18 and 19 are dependent upon claim 1, and thus are also allowable for at least the same reasons as claim 1. New claims 20 and 21 are dependent upon claim 14, and thus are also allowable for at least the same reasons as claim 14.

CONCLUSION

Based on the foregoing remarks, Applicants believe that the rejections and objections in the Office Action of October 4, 2004 are fully overcome and that the application is in condition for allowance. If the Examiner has any questions regarding the case, the Examiner is invited to contact Applicants' undersigned representative at the number given below.

Respectfully submitted,

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Amendments to the Drawings:

Attached are five sheets of drawings that include changes to Figures 6B, 14, 22B, and 22C. These sheets replace the original four sheets that included Figures 6B, 14, 22B, and 22C. The Examiner is respectfully requested to approve the amended drawings.